Space Weather Forecast

Issued on Saturday, 25 March 2023 at 12:34 Local

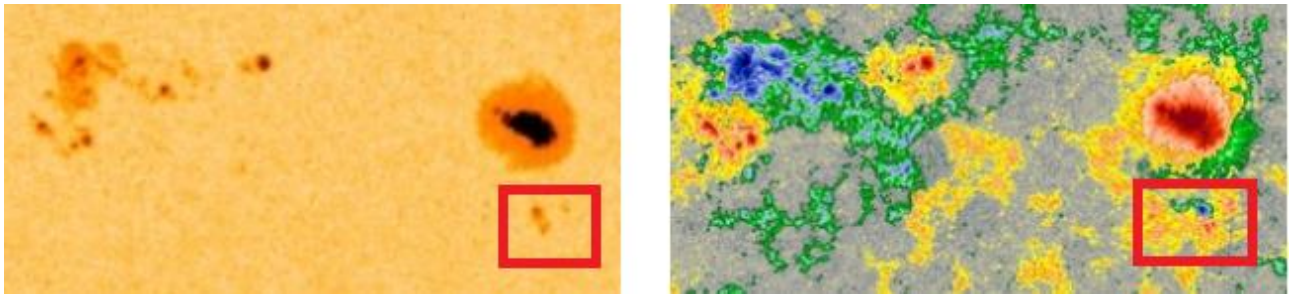
This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Now reduced Chance of G1 Minor geomagnetic storms. Ongoing Chance of R1 Minor radio blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with occasional minor Common-class X-ray flares recorded. The largest of these flares was a small common-class emitted from the largest and most complex group on the facing side of the Sun at 24/1340UTC. The above sunspot region is one of eight on the Earth-facing side at present, and is one of relatively few to have shown some growth, with proliferation and increasing area in its trailing spots for a time. The remaining regions on the disc were less active, with more limited size and magnetic complexity.

Figure 1: Visible (left) and magnetic (right) imagery at 25/1130UTC of the largest and nominally the most complex sunspot group on the Sun at present. Also shown boxed red is a potentially more unstable configuration - whereby opposing magnetic polarities are confined within the same 'penumbra'. This group has a history of such transitory spots, mainly in its trailers, but these have yet to translate to significant X-ray activity.



No Earth-directed CMEs were observed in available satellite imagery. A 'filament'-like emission (arc of plasma) was observed moving in the vicinity of the largest sunspot group around 24/1900UTC, however there is no evidence of this having left the immediate solar environment in available imagery. Other peripheral events noted in the period included a 'prominence eruption' (arc of plasma leaving the Sun's edge) from the northwest at 24/2200UTC.

Solar Wind / Geomagnetic Activity: The solar wind showed the extreme tail end of the 23 March CME arrival, soon giving way to a fast wind regime from a 'coronal hole'.

Solar wind speeds showed an initial slight decline within slightly elevated levels, however this descent reversed as the fast wind took hold, increasing to become elevated by the period's end. The number of particles in the solar wind followed a roughly level trend near their typical background level throughout, while their associated magnetic field fell slightly from slightly elevated to normal levels. This represented the very last stages of the CME and the fast wind onset that followed. The north-south component of the magnetic field was mainly anti-aligned with Earth's

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field initially, but became more variable and smaller-scale with time.

The net result of the above solar wind measures was for initial active conditions (i.e. just shy of Minor Storm G1), gradually falling to quiet as the 24 hours progressed.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is most likely to remain low, but with a chance of becoming moderate with any isolated Moderate-class flares. The main region likely to give such flares is the largest on the facing side in the south-central portion of the Sun.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs now feature in the forecast.

The only fast wind feature that should form part of the four-day forecast is now in course. Wind speeds are most likely to remain elevated for the current UTC weekend, ahead of a slow decline thereafter.

Geomagnetic activity should peak early in the forecast period with perhaps a chance of Minor Geomagnetic storm G1, else becoming largely quiet once again into the new UTC working week as the fast wind wanes.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there remains a daily slight chance of reaching S1 or greater, should any significant flares occur from the large number of sunspots on the Sun at present.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	10	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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